Resistance to antibiotics of *Shigella* strains isolated in Somalia

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Abstract

The resistance to antibiotics of 240 Shigella *strains isolated in Somalia from 1973 to 1976 was studied. Many strains, particularly those of* Shigella dysenteriae *type 1, were found to be resistant to more than one drug. In view of their resistance to ampicillin, chloramphenicol, streptomycin, tetracycline, and sulfonamides, it is suggested that polymyxin B or M sulfate—which have proved to be effective* in vivo*—should be used for the treatment of clinically typical cases of bacillary dysentery.*

The repeated emergence of *Shigella* strains resistant to one or more antibiotics has been reported in the literature. This phenomenon raises problems not only for the treatment of bacillary dysentery but also for its epidemiology. Although Cahill et al. (*1*) have reported one epidemic due to *S. dysenteriae* type 1 in the area of Johar, Somalia, there is no basic reference work on the resistance to antibiotics of shigellae in the country as a whole.

The resistance to antibiotics of various serotypes of *Shigella*, and the most effective antibiotic treatment of clinically typical cases of bacillary dysentery, are discussed in this paper.

Materials and methods

Collection of specimens. Samples of faeces were collected between March 1973 and October 1976 from various hospitals and dispensaries in Mogadishu and from rural areas of Somalia.

Isolation of bacilli. The specimens were streaked on desoxycholate citrate agar (Difco [a]). After incubation for 18 h at 37°C, suspect (smooth and colourless) colonies were transferred to triple sugar iron agar (Difco [a]).

Determination of serotypes. Cultures suspected of being shigellae on triple sugar iron agar were identified by the slide agglutination test with Bacto Shigella grouping and typing antisera (Difco [a]).

Biochemical tests. When the results of slide agglutination were positive, the following properties of each *Shigella* strain identified were studied: motility, hydrolysis of urea, indole production, and lactose fermentation.

Sensitivity test. The sensitivity test was performed on DST agar [b] by means of the standard methods for public health and bacteriological laboratories used in Hungary (*2*). The drugs tested were: ampicillin, chloramphenicol, kanamycin, neomycin, polymyxin B, streptomycin, tetracycline, trimethoprim–sulfamethoxazole, and sulfonamides. The zone of inhibition was determined by means of standard strains from the Hungarian National Culture Collection Centre, and the diameter of the zone of inhibition was measured with compasses.

Results and discussion

Table 1 shows the resistance to drugs of 240 *Shigella* strains. The greatest resistance (92.9% of the strains) was to sulfonamides, and the lowest (1.7%) to neomycin. All the strains were sensitive to polymyxin B. Resistance to 7 drugs was seen in 13 (5.4%) of the 240 strains. The corresponding proportions resistant to fewer drugs were: 37 (15.4%) to 6 drugs; 94 (39.2%) to 5; 23 (9.6%) to 4; 28 (11.7%) to 3; 13 (5.4%) to 2; and 20 (8.3%) to one drug. Resistance to the largest numbers of drugs (5, 6, or 7) was observed mainly in strains of *S. dysenteriae* type 1 (152 strains). *S. flexneri* came next with 49 strains, resistant mainly to 3, 4, or 5 drugs; 16 *S. boydii* strains and 11 *S. sonnei* strains were drug-resistant. Only 5% of the 240 strains were sensitive to all the drugs tested.

These figures confirm previous reports (*3–5*) that shigellae are highly resistant to the sulfonamides that are so frequently used for the treatment of bacillary dysentery. However, it seems that certain

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[a] Difco Laboratories, Detroit, MI 48232, USA.

[b] Diagnostic sensitivity test agar, manufactured by Oxoid Ltd, London, England.

Table 1. Drug resistance in 240 *Shigella* strains isolated in Somalia, 1973–76

Antibiotics		Sensitive		Resistant	
		No.	%	No.	%
ampicillin	20 μg	100	41.7	140	58.3
chloramphenicol	30 μg	75	31.3	165	68.7
kanamycin	30 μg	187	77.9	53	22.1
neomycin	100 μg	236	98.3	4	1.7
polymyxin B	300 units	240	100.0	0	0.0
streptomycin	30 μg	48	20.0	192	80.0
sulfonamides	400 μg	17	7.1	223	92.9
tetracycline	30 μg	57	23.8	183	76.2
trimethoprim–sulfamethoxazole	25 μg	195	81.3	45	18.7

sulfonamide combinations, notably trimethoprim–sulfamethoxazole, give good results. According to Biola Mabadej (*3*), diarrhoea stopped and the stool or rectal swab became negative after 3 days of therapy with this drug combination. In the present study (see Table 1), 18.7% of the strains examined showed resistance to trimethoprim–sulfamethoxazole *in vitro*, but the *in vivo* effect could not be determined because of the lack of this drug.

None of the *Shigella* strains tested in this experiment was resistant to polymyxin B. Ribiczey & Beke (*6*) reported that orally administered polymyxin M shortened the duration of fever and diarrhoea. The advantage of administering polymyxin M orally is that the drug is not absorbed from the intestinal tract. It therefore does not damage the parenchymal organs and produces its effect locally.

Neither polymyxin B nor polymyxin M is obtainable in Somalia or neighbouring countries. However, polymyxin M tablets are imported from " MEDEXPORT ", Moscow. A further advantage of polymyxin M is that it is inexpensive, the cost of 5 days' treatment for an adult being 18 So.Sh. (US$ 1=6.23 So.Sh.).

Considering that *S. dysenteriae* and *S. flexneri* strains predominate and that they have demonstrated resistance to the commonly used antibiotics, it is preferable to use the more effective polymyxin M or B for the treatment of clinically typical bacillary dysentery.

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